Job Satisfaction and Quits

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Abstract

We test the wealth maximization theory of quitting behavior on the German Socioeconomic Panel (1985-2003). With the interpretation of job satisfaction as an expression of the experienced preference for the present job against available alternatives, the propensity to stay in the present job is simply related to the residual of a job satisfaction equation. We show that this residual is a better predictor of quits than the overall level of satisfaction. Furthermore, we validate a dynamic extension of the economic theory of quits for which uncertainty in the expectation of future events plays a decisive role.

Keywords: Voluntary quit, job satisfaction, surprises, wealth maximization model.

JEL: J28, J63, C23.

1 Introduction

The decision to quit offers the ideal illustration of a simple microeconomic story that becomes very difficult to test as it relates observed behavior to unobservable motives. The simple story is that workers optimally search and learn about their outside job opportunities or their productivity on their present job. As they acquire new information, they decide to quit their current employer as soon as their expected present value becomes lower in their present job than in an alternative job or non-employment. The difference between these two expected present values of future pecuniary and non-pecuniary income indicates the worker's *propensity to stay* and determines her decision to quit when it turns negative. However, economists have so far been unable to provide an exhaustive ordinal measure of individuals' propensity to stay or, conversely, their *propensity to quit*, because

expectations of future outcomes and opportunities cannot be directly observed and the non-pecuniary subjective value of jobs has no objective measure. As a result, they have often relied on very crude and partial proxies for the propensity to quit[2]. In the present paper, we derive an exact measure of a worker's propensity to stay (quit) from subjective data on her reported job satisfaction and use the latter for a direct test of the microeconomic theory of quits.

Freeman (1978) had observed more than twenty years ago that reported job satisfaction is a good predictor for job mobility over and above the effect of lagged wages. The more satisfied with their job people proclaim themselves, the less likely they are to quit. Akerlof, Rose and Yellen (1988), Clark, Georgellis and Sanfey (1998) confirmed Freeman's findings on US and German data sets. In these studies, satisfaction is implicitly assumed to reflect individuals' expectations about future wages and working conditions. Here, we refer explicitly to a new theory of satisfaction provided in a companion paper (Lévy-Garboua and Montmarquette, 2004). According to the latter, job satisfaction reflects a worker's experienced or post-decisional preference for her job relative to outside opportunities. The worker who reports being satisfied with her job ranks the mental opportunity of choosing the same job from the beginning until the present date and possibly in the future, *with today's knowledge* of what happened on the job and available alternatives. This definition implies that, under perfect foresight, workers would always be satisfied with their own voluntary choice of job in the past. It takes unforeseen events, or *surprises*, to have workers wish to deviate

[2] Parsons (1991) approximated the value of current job by the present wage. Bartel and Borjas (1981) used the individual wage growth observed in the past. While these two studies ignored outside opportunities, Viscusi (1979) and Lynch (1991) compared the value of current job to that of an alternative job by introducing the current wage gap as the residual of an earnings equation. Other studies (e.g. Bartel 1982, Akerlof et *al.* 1988, Van Ophem 1991) emphasized the value of job amenities as an important determinant of job satisfaction and quits.

from their own past decision and report a variable satisfaction with their job over time. Satisfaction relates to dynamic uncertainty. Moreover, most workers will not be choosing a single job in their whole life. Even a rational worker with perfect foresight may be satisfied with her job in the past and still want to change job in the near future, just like a spectator who enjoyed a show will usually not want to attend the same show next week. Lastly, since jobs are commonly experienced over an extended period of time, job satisfaction indicates both the worker's enjoyment of past experience and her expected enjoyment if she stays in this job in the future. For the three reasons mentioned above, i.e. surprises, multiple choices of jobs over time, and joint valuation of past and future, one's satisfaction with past experience of job and propensity to stay in this job in the near future are loosely connected. However, the framework that we use suggests a method for extracting the unobservable propensity to stay in one's job from the self-reported job satisfaction. It consists of regressing job satisfaction on observable past components of satisfaction with panel data and isolating the propensity to stay in the present job as the residual of this equation. Previous authors who regressed the mobility decision on reported job satisfaction have implicitly included the future component of job satisfaction, and this might explain why they found job satisfaction to be a good predictor of mobility. However, our model implies that the residual of an equation in which job satisfaction is regressed on a list of past observable components should be an even better predictor of quits than is overall job satisfaction. A decisive test of this prediction is performed in the empirical part of the paper. It supports the view that the decision to quit is influenced by the residual of the job satisfaction equation, and not by the level of job satisfaction.

This methodology also affects the specification of quitting behavior. Since job satisfaction relates to dynamic uncertainty and simulates a virtual decision to replicate one's past job decision, the further decision to stay or quit should be predicted in the same framework and fully incorporate the role of surprises and uncertainty surrounding the expectation of future events. The

incorporation of unsystematic search results in a dynamic extension of the standard economic theory of quits which receives strong confirmation from the data. In particular, unsystematic search brings a simple and intuitive explanation to the negative effect of tenure on quits, which cannot be explained by systematic job training and search behavior (Mortensen 1988).

The model is tested with the German Socioeconomic Panel (GSOEP) over the years 1985-2003. This Panel data set is especially interesting for our purpose because of its length, broad coverage of adult population, and the comprehensive description of jobs including opinions held about the latter. Since Germany is one of the economic powerhouses of Europe, and has the lowest rate of separation[3], knowledge of the determinants of mobility in Germany is of particular pertinence.

The theoretical framework for our econometric model of job satisfaction and quits is presented in section 2. A brief description of the German Socioeconomic panel data and of our empirical strategy follows in section 3. The propensity to stay (quit) is estimated in two stages. First, we estimate the job satisfaction equation depending on "wage gaps" estimated as residuals of a wage equation. Results of this estimation are reported in section 4. Second, the residual of the job satisfaction equation is our measure of the worker's propensity to stay in her current job, which will serve as an explanatory variable in the quit equation. The latter's estimation and results appear in section 5, followed by a conclusion (section 6).

2 The Theoretical Framework

2.1 Quits

[3] Report to the European Commission in 1989.

The wealth maximization model of separation provides a simple expression for the propensity to quit: the individual will consider quitting if the expected benefits outside of the firm are greater than those inside the firm plus mobility costs. Let $E_{ia}V_{ia}$ be the present value of future wages and job amenities expected by worker *i* at time *a* $(a > 0)$ if she stays with her employer, $E_{ia}V_{ia}^{*}$ the corresponding value if she quits, and C_{ia} the cost of mobility. E_{ia} is the expectation operator conditional on all information available to individual *i* before time *a*. The worker will consider leaving her employer if

$$E_{ia}V_{ia} - E_{ia}V_{ia}^{*} + C_{ia} < 0 . \tag{1}$$

The total value of a job in the future is the sum of its productive value, or human capital, $E_{ia}\,H_{ia}$ and the value of non-pecuniary job amenities $E_{ia}U_{ia}$

$$E_{ia}V_{ia} = E_{ia}H_{ia} + E_{ia}U_{ia} . \tag{2}$$

The propensity to quit Q_{ia}^{**} is defined by

$$Q_{ia}^{**} \equiv -(E_{ia}V_{ia} - E_{ia}V_{ia}^{*}) . \tag{3}$$

This propensity to quit is the primary cause of the individual's decision to quit her employer[4] at time *a*. It describes an individual expectation of future outcomes subject to change in light of new

[4] Costs of search and learning may be neglected because workers search while employed and learn by doing.

information. Moreover, since the decision to quit is empirically observed at discrete intervals, the occurrence of unexpected surprises in the meantime may reorient the decision to quit in contradiction with the once experienced propensity to quit. These remarks can be further specified by assuming that surprises $Q_{i,a+1},\ldots,Q_{i,a+t}$, occurring in consecutive periods $a+1,\ldots,a+t$ and affecting the propensity to quit, are i.i.d. random draws from a normal distribution with a given variance. The mean of this distribution is unknown but has a prior distribution which is also assumed to be normal. For a quadratic cost of error, the mean value will be the rational expectation of the propensity to quit variable. Consequently, the decision to quit in the time interval (*a*, *a* + 1) can be described by the following Bayesian model (for a classic treatment, see DeGroot, 1970: chapter 9):

$$Q^{**}_{i,a+1} = \frac{k_0}{k_0+h}Q^{**}_{i,a} + \frac{h}{k_0+h}Q_{i,a+1}$$

in which k_0 and h denote the information (precision) contained in the prior expectation and subsequent surprise respectively, and k_0+h represents the precision of the posterior distribution. By *t* iterations of this formula, we get the final propensity to quit after *t* random experiences:

$$Q^{**}_{i,a+t} = \frac{k_0+(t-1)h}{k_0+th}Q^{**}_{i,a+t-1} + \frac{h}{k_0+th}Q_{i,a+t}.$$

$$= \frac{k_0}{k_0+th}Q^{**}_{ia} + \frac{h}{k_0+th}\left[Q_{i,a+1}+\ldots+Q_{i,a+t}\right] \qquad (4)$$

Hence, we can relate the discrete decision to quit in the time interval $(a,a+t)$ to the estimated propensity to quit at time *a*, and to later surprises affecting the propensity to quit in the interval:

$$Q_{ia,a+t} = 1 \quad \text{if} \quad Q_{ia}^{**}\beta + Z_{ia,a+t}\gamma + \eta_{ia,a+t} > 0$$

$$Q_{ia,a+t} = 0 \quad \text{if} \quad Q_{ia}^{**}\beta + Z_{ia,a+t}\gamma + \eta_{ia,a+t} \leq 0 \qquad (5)$$

where $Z_{ia,a+t}$ is a vector of variables, including observable surprises, which may affect the individual's decision to quit between a and $a + t$ in addition to the propensity to quit at time a, γ is a vector of constant coefficients, and $\eta_{ia,a+t}$ is a random disturbance including the relevant unobservable surprises which occurred in the same time interval. Equation (4) shows that the coefficient β essentially lies between 0 and 1.

Moreover, as can be seen from the first line of equation (4), the propensity to quit converges to a stable attitude when $t \to +\infty$. This entails that, with growing tenure, the worker gets eventually used or adapted to her job and no longer wishes to quit after being confronted with a bad job surprise of given magnitude. The individual adaptation to job is responsible for a negative effect of tenure on job mobility, while Mortensen (1988) has shown that the standard analysis of job training and job matching, which emphasizes systematic search behavior, implies a positive effect if the current wage is held constant. The rationale of the latter prediction is that the value of continued employment, given the current wage, should fall with tenure because the option value of a job diminishes, as what can be learned from it or what can be known from it about the quality of match diminishes with tenure under plausible assumptions. However, previous observations of Topel and Ward (1992) and Galizzi and Lang (1998) on U.S. and Italian data sets have repeatedly found a strong negative effect of tenure, given the current wage. These, once paradoxical, findings heavily suggest that the role of unsystematic adaptation and habit formation should certainly not be overlooked in the economic theory of job mobility.

2.2 Job Satisfaction

Job satisfaction is defined as an index of preference for the experienced job against outside opportunities conditional on information available at time *a* (Lévy-Garboua and Montmarquette, 2004). This implies *a comparison* between the real experience of job in the past (between 0 and current period, denoted a) and the mental experience of outside opportunities until then, that is, regret-rejoicing of past events (Hamermesh, 2001). It also implies the comparison between future expectations of own job and outside opportunities in the future, that is, what we called the propensity to stay. Denoting by R_{ia} the past comparison term and $(-Q_{ia}^{**})$ the future comparison term, the ordinal index of job satisfaction at time *a*, J_{ia}, will be defined as:

$$J_{ia} = 1 \quad \text{if} \quad R_{ia} - \frac{Q_{ia}^{**}}{(1+r_a)^a} > 0$$

$$J_{ia} = 0 \quad \text{if} \quad R_{ia} - \frac{Q_{ia}^{**}}{(1+r_a)^a} \leq 0 \qquad (6)$$

Furthermore, like the propensity to quit (see equation (3)), the past component of job satisfaction is a discounted sum of experienced wage and non-wage gaps since the beginning of work[5]. Based on (2) and (6), we write:

[5] Two natural ways of defining the "beginning of work" are either the period of entry in the current firm or minimum school-leaving age. Without unusually long panel data, however, it is very difficult to discriminate between these assumptions. For further discussion of this issue, see Lévy-Garboua and Montmarquette (2004).

$$R_{ia} = \sum_{t=1}^{a} \frac{y_{it} - y_{it}^{*}}{(1+r_t)^{t-1}} + \sum_{t=1}^{a} \frac{u_{it} - u_{it}^{*}}{(1+r_t)^{t-1}} \qquad (7)$$

where y_{it} (y_{it}^{*}) designate wages earned on the job (wages offered outside), u_{it} (u_{it}^{*}) stand for the non-pecuniary value of jobs (alternatives), and r_t is the discount rate on period *t*.

As shown by equations (6) and (7), the latent variable underlying job satisfaction has three components. The first is the discounted sum of wage gaps experienced by the individual since she started working. It describes how the actual income profile has ranked high relative to the best-known alternative profile. Such wage gaps can be computed with panel data as the residuals from earnings equations (see appendix 1). The second term represents the corresponding discounted sum of non-wage gaps. Although it is probably very difficult to evaluate, it can be approximated, as will be seen in section 4, as long as we observe a number of job-related satisfactions (e.g. leisure, health). Both terms reflect past and present values, which are supposedly known by the individual with certainty and no more subject to change. The last component captures the propensity to stay with one's employer in the future times a discount factor. Equations (6) and (7) show that the propensity to stay can be recovered as the residual of a regression where job satisfaction is the explained variable and the regressors approximate the latter's past components.

2.3 *A new link between job satisfaction and quits*

It follows from the interpretation of job satisfaction retained here that there is no causal link between job satisfaction and quits. These two behaviors merely have an important factor in common, which we denominated the individual's propensity to quit. For instance, dissatisfied workers have a higher quit rate than satisfied workers because the former on average give a lower expected present value to their job than to outside opportunities in the future. But it is exactly for

the same reasons that quitters report more satisfaction in their new job than in their old one (Akerlof, Rose, and Yellen 1988) or that mobile workers experience greater increases in satisfaction if they were willing to leave than if they were not (Bartel and Borjas 1981, Gottschalk and Maloney 1985).

In the model of the decision to quit described with equation (4), a difficulty is that the propensity to quit, Q_{ia}^{**}, of equation (3) compares two expected present values of future outcomes, which are both unobservable. But, as mentioned above, the latter can easily be recovered as the residual of a job satisfaction equation looking like (6). Since the residual of job satisfaction recovers the individual propensity to stay with the current employer which is directly unobservable and constitutes a primary cause of the decision to either stay or quit, it becomes possible to isolate the personal economic incentives for leaving a job from family or other reasons, and to build a direct test of the wealth maximization model of separation. Another empirical strategy was taken up by Galizzi and Lang (1998). They tested a broader prediction of the microeconomic theory, namely that, given the current wage, quits are declining in the level of expected future wage growth in the present firm and increasing in the value of outside opportunities. They approximated expected future wage growth in the present firm by the average wage paid to similar workers in the establishment and outside opportunities at the industry level but they didn't give an exact measure of each worker's propensity to quit. By expressing job satisfaction as a preference for the experienced job relative to contemporaneous outside opportunities, we can extract an exact measure of the worker's propensity to quit and directly validate the wealth maximization theory of job separation.

3 The data and empirical strategy

Since job satisfaction is deeply rooted in one's past experience while quits will be taking place in the future, our study requires individual panel data over an extended period of time. We use the German Socioeconomic Panel (GSOEP) data set between 1985 and 2003 as it contains rich information on individual wages, occupation, education and employment, as well as a number of job-related satisfaction variables. Workers were asked to evaluate their job satisfaction level on a 0-10 scale, and similar data about the respondents' satisfaction with job-related concerns like health and leisure time are also reported.

The rate of attrition in the database makes it difficult to retain the same individuals in the sample for more than five years. On the other hand, the quality of estimation requires that individuals be present in the panel for the maximal length of time. Thus we choose to observe individuals over five consecutive years. This period is divided in two intervals. The first four years are being used to estimate the past and present components (pecuniary and non pecuniary) of job satisfaction reported the fourth year. The probability of quitting is being determined over the last remaining year. According to equation (7), the pecuniary part of the job satisfaction's past component is a discounted sum of wage gaps. We estimate these wage gaps by the residuals of earnings equations in the first four years. We regress the reported satisfaction in the fourth year on the sum of these residuals, on variables representing non-pecuniary benefits (the other satisfaction variables), and on other individual characteristics. After controlling for the main observable past variables that determine the past component of job satisfaction, the estimation's residual must essentially capture the latter's future component. This provides a precise estimate of the future component of satisfaction, or each individual's propensity to stay, as experienced in the fourth year. We determine the probability of quitting for the following year from this component. If a negative and statistically significant coefficient is associated with this variable, we can validate the simple

assumption that workers maximize the expected present value of their job, possibly under dynamic uncertainty.

The implementation of this empirical strategy imposes specific requirements on the data. In addition to being present in the sample during five consecutive years, selected individuals must report an income from work or unemployment insurance for the first three years of this period, be employed in the fourth year and report their wage and job satisfaction, and, during the fifth year, they must have been questioned to establish whether they quit the job mentioned in the fourth year. Before performing the estimations, we account for the probability of being selected—i.e. having answered all the questions used as explanatory variables--among individuals present five years and working in the fourth year. This allows us to correct for a potential selectivity bias[6].

In order to circumvent the problem of finding a very large sample of individuals with consecutive entries covering more than five years, we repeat our estimates of job satisfaction and the probability of quitting on fifteen consecutive years from1988 to 2002. Therefore, we observe fifteen overlapping panels of workers between 1985 and 2003. The number of observations in each sample normally lies between 2500 and 3500, with individuals of 20 years of age and over in the year job satisfaction is reported (the average age is around 41). This allows us to verify the robustness of the results and examine business cycle effects. However, the reunification of Germany which occurred in 1990 introduces a structural heterogeneity in the GSOEP sample, with three distinct

[6] The results of the probit estimates associated with selectivity bias are not presented. Variables included in the selection equation are: employment status in the first year of the panel, household type, age and its square, gender, nationality, residential status (owner, satisfaction). Having a full time job, being a man and being German increases the probability of being selected in the panel. The relation with age is inversely U-shaped.

phases. Until 1989, the sample was formed exclusively of Germans or foreigners residing and moving in the former Federal Republic. Between 1990 and 1992, former residents of West Germany were followed-up when they moved to East German Länder but former residents of East Germany were still not included in the sample. Finally, all Germans or foreigners residing and moving in the East or in the West were included in the sample from 1993 onwards.

Our estimates of the wage equations, of job satisfaction and of mobility are performed in three stages. We first estimate the wage equations from which the residuals are extracted (see appendix 1). In the next step, the latter serve as explanatory variables in the satisfaction equations. Finally, the residuals of the satisfaction equations are used to explain observed quits in the following year. This procedure of estimation by stages is not necessarily the most efficient, and corrective measures need to be implemented. However, the implicit assumption of a sequential choice of job and separation is natural here, and it should also be clear from the theoretical section that the causal link goes from wages to job satisfaction and mobility, but not the other way round. Mobile workers have no guarantee that they will receive greater wages or greater satisfaction simply by virtue of their mobility.

[Insert table 1, about here]

Table 1 exhibits some descriptive statistics derived from our sample about job, leisure, and health satisfactions, job mobility and the monthly wage. It should first be noticed that the satisfaction level decreases abruptly for the three types of satisfaction that we consider between 1992 and 1993, that is, when East Germans are included in the sample. However, this major change essentially modifies the constant term of the job satisfaction equations and has no other incidence upon our present analysis. Respondents are a little more satisfied with their job than they are with leisure time. The real monthly wage of German workers fluctuates within a narrow band over the

period of study. Over a year, less than 5% of individuals normally experience quit. However, quits formed an unusually high share of all separations (see also Büchtemann and Höland, 1989) before the reunification. After culminating to an average of 54% in the 1988-1992 period, this share went down to an average of 36% in the 1993-2002 decade. Quits are also higher in years in which the unemployment rate is low, in contrast with the rate of layoffs and separations due to plant closures and redundancy which parallels the unemployment rate. This appears to confirm the works of Akerlof, Rose, and Yellen (1988) and Anderson and Meyer (1994), who show that voluntary departures are cyclical in contrast with involuntary departures that are counter-cyclical.

[Insert tables 2 and 3, about here]

Table 2 shows the average quit rates between years a and $a + 1$ found on our sample for workers reporting their job satisfaction level on year a. The usual negative relation between job satisfaction and quits is apparent, since the less satisfied workers (reporting a level smaller than 8 on a 0-10 scale) are about two-thirds more mobile on average than the more satisfied ones (reporting a level of 8 and more). We also verified in table 3, after Akerlof et *al.* (1988), that quitters between years a and $a + 1$ tend to be more satisfied with their new job than with their old one. The average proportion of quitters reporting a satisfaction level of 8 and more in any year of the 1988-1992 period (1993-2002 period) was 43.41% (35.56%) on year a (in their old job) versus 59.68% (55.13%) on year $a + 1$ (in their new job). This contrasts with the small decline of the share of stable workers between years a and $a + 1$ reporting the same level of satisfaction with their job: 54.54% (47.73%) on year a versus 52.21 % (46.17%) on year $a + 1$. Moreover, the same pattern shows consistently on the fifteen panels, both before and after the reunification of Germany.

4 Job satisfaction: estimation and results

According to equation (7), the observable determinants of job satisfaction should essentially

lie in the present value of wage and non-wage gaps. In this section, we verify this prediction and its corollary that, after controlling for wage and non-wage gaps, few other variables matter. The GSOEP makes it possible to compute wage gaps in four successive years[7]. For instance, job satisfaction in 1988 is related to wage gaps estimated in 1985, 1986, 1987 and 1988. Since our observations span over 15 overlapping four-year panels, we adopted everywhere a zero discount rate for simplicity[8]. This had little impact on the significance of our results. Preliminary tests on the period 1985-1991 showed that results are not much affected by choice of the real interest rate for a wide range of constant discount rates. Discounting wage gaps by a variable real interest factor did not change the qualitative conclusions either on the same period (Lévy-Garboua, Montmarquette and Simonnet, 2004). At first sight, the measurement and discounting of non-wage gaps looms like an even more formidable task because job amenities are manifold, difficult to measure and have a subjective value. However, our theory of satisfaction judgments brings a neat solution to this recurrent problem by providing a direct index of the present non-pecuniary value of job for each individual. In our view, job-related reported satisfactions like satisfaction with respect to leisure time and health indicate the preference for the sequence of experienced leisure or health occurrences relative to their contemporaneous alternatives. They are not only more precise measures of the non-

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[7] Some workers had more than one job in the meantime. Whether wage gaps experienced in previous jobs enter in job satisfaction in the same way as wage gaps experienced in the current job is an empirical issue as mentioned in note 5. Simonnet (1997) shows on the same data that both types of wage gap explain job satisfaction. In reporting their job satisfaction, workers do seem to consider all employment spells which led them to their current job.

[8] With discounting, the wage gap coefficient should decline with age and experience when future expectations are held constant. This prediction was corroborated by Lévy-Garboua and Montmarquette (2004) who segmented their Canadian sample in four age intervals. For simplicity, we maintained here a single coefficient for the wage gap but controlled for other effects of experience by adding experience and its square to the list of regressors.

pecuniary benefits of a job, but more consistent as well. A rational individual will consistently refer all of her job-related satisfactions to a unique sequence of outside opportunities while the separate estimation of these references by econometric techniques cannot achieve this task. Thus, we estimate job satisfaction equations by

$$J_{ia} = \lambda_a + \mu_a \sum_{t=a-3}^{a} \hat{\varepsilon}_{it} + \sum_{j=1}^{2} \nu_{ja} \text{satis}_{\text{jia}} + \text{X}'_{\text{ia}} \beta'_a + \upsilon_{ia} \quad , \tag{8}$$

where $\hat{\varepsilon}_{it}$ are estimated wage gaps, satis_{jia} designates a non-pecuniary satisfaction and υ_{ia} is a random disturbance that will serve as an index for the propensity to stay.

Notice that, if higher earnings compensate for lower value of the non-pecuniary components of the job, the omission of job-related satisfactions in this equation might lead to a downwardly biased estimate of the coefficient of the sum of wage gaps. Controlling for these non-pecuniary satisfactions further allows us to control for unobserved individual heterogeneity since the personality traits that correlate with happiness[9] appear to be highly correlated with any kind of satisfaction but are much less likely to correlate with the estimated wage gaps. Other control variables included in equation (7) are experience and its square, religion, education (degree), gender, marital status, household income and participation to political activities. As we impose no age restriction whatsoever on our sample, experience and its square were introduced in the regression to control for the U or J-shaped relation of job satisfaction with age or experience commonly found in the literature. Such relation receives a natural explanation in the present framework (see also Lévy-Garboua and Montmarquette 2004). If young workers may get down to earth after becoming

[9] Diener *et al.* (1999) mention extraversion and neuroticism, self-esteem, optimism and the predisposition to ruminate on the negative events.

conscious of their mistaken overconfident initial predictions, they will eventually experience growing satisfaction with their job in the long run. The reason is that the discounted sum of past wage and non-wage gaps is increasingly likely to be positive as experience grows if individuals have rational expectations and capture rents on their job, while the future component of job satisfaction gets smaller in absolute value as the remaining life at work diminishes. Since we postulate that a major part of the future component of job satisfaction is captured by the residual of the job satisfaction equation, we also allow for job satisfaction residuals to be negatively correlated with workers' experience. Consequently, we estimate a heteroskedastic Probit model[10] by expressing that heteroskedasticity is caused by experience.

[Insert Table 4, about here]

The estimation of the job satisfaction equations is reported in table 4. The main result is that the coefficient of the sum of experienced wage gaps is significantly positive in 14 out of 15 years of observation: at the 1% level (one-tail) for 11 years and at the 5% level in three more years. The single exception, for which this coefficient is positive but marginally below the 5% significance level,

[10] A Probit estimation was preferred to the more traditional ordered Probit found in the job satisfaction literature (eg. Clark and Oswald 1996, Lévy-Garboua and Montmarquette 2004). This choice does not entail a great loss of valuable information here because prior analysis of the data showed that the histogram of satisfaction variables on an 11-point scale is unimodal and concentrated in the upper scores. Moreover, it allows an equal treatment of all satisfaction variables (leisure and health) appearing in the wage and job satisfaction equations. It also helps to capture the past non- pecuniary component of job satisfaction in equation (7) so as to have a more precise measure of the propensity to quit (see the discussion above in the same section). Ordered Probit models were tried in a previous version yielding comparable results. Linear probability models also gave results similar to those of the binary probit model. The same remark applies to the mobility equations.

is found in 1990, a year in which the sample's attrition is exceptionally high[11]. It should also be noticed that the coefficient of the sum of wage gaps is remarkably stable over fifteen different panels. This should make us feel very confident in the robustness of the effect and in the precision of the propensity to stay index that we construct as the residual of this equation. The importance of non-wage gaps in predicting job satisfaction is attested by the high significance level of both satisfactions with leisure time and health. The coefficients of these two variables remain fairly stable across the fifteen panels. Household income also has a positive significant effect on job satisfaction most of the time. This variable was included in the regression to take care of the jointness of labor supply decisions of family members that is not captured by individual-specific wage gaps. Finally, we observe, as predicted, a significant negative coefficient for the heteroskedasticity variable (twelve times out of fifteen).

A strong prediction of our job satisfaction model, described by equation (7), is that wage and non-wage gaps are the sole determinants of job satisfaction. The additional effects of household income and the heteroskedasticity variable are also consistent with the model. Therefore, it is reassuring to find that, after controlling for past and current wage gaps and non-wage gaps, so few variables explain job satisfaction. Out of fifteen successive panels, higher education degrees would seem to increase job satisfaction only four times, being single to have a negative impact only five times, gender and religion only twice, and political activities never. Moreover, the relation of job satisfaction with experience is unambiguously U or J-shaped, but it is below the usual level of significance in eight of the fifteen years.

5 Quits : estimation and results

[11] The number of observations is 1893 in 1990 and around 2500 in adjacent years.

Quits include all worker-driven motives of departure from one's employer whatever may be the reason for it. Since all motives of separation initiated by the firm such as layoff, redundancy, firm closure, contract termination or retirement were explicitly listed in the questionnaire, all other reasons for job separation are classified as quits. The internal labor market offers another way of changing job without having to leave one's employer that is captured by firm size. According to our interpretation of job satisfaction summarized by (6) and (7), the decision to quit after period a should be predicted, not by the overall job satisfaction in the same period, but by the residual of the job satisfaction equation. We estimate the decision to quit between a and $a+1$, as described by equation (5). The decision to quit between a and $a+1$ is also triggered by surprises which occurred after the date when the propensity to quit was measured. Therefore, we introduce additional variables which partly control for such contemporaneous surprises in the regression. Family changes and unexpected events which occurred to the worker after reporting her job satisfaction may make a worker change her mind, either by freeing her from a former tie (e.g. separation of spouses) or by creating a new tie (e.g. cohabitation). In our estimation, we mention family changes occurring between a and $a + 1$, like getting married or beginning to share residence, separating from a spouse or becoming widowed, and having a new birth or a child moving out. The cumulated effect of past surprises is captured by tenure, which should exert a negative effect on quits in our dynamic model. We also control for gender, education (degrees), and household income. Finally, we include the current wage (in year a) as this variable has often been used to predict quits. In our model, it should be insignificant. As marital status may influence the decision to quit because a married or cohabiting person has a greater cost of mobility than a single person, we allow for the residual being correlated with marital status by estimating a heteroskedastic Probit model and by expressing that the marital status creates heteroskedasticity.

The residual of the job satisfaction equation is supposed to capture essentially the future component of satisfaction, that is, also the propensity to stay times a discount factor.

[Insert Tables 5, 6a and 6b about here]

Table 5 shows the estimates of the Probit regressions of quits over fifteen years.[12] Coefficients of the residual are significant seven times at the 1% level and four times at the 5% level. However, since satisfactions with leisure and health introduced in the job satisfaction equation capture the entirety of the discounted sum components, both in the past and in the future, the estimated residual of job satisfaction tends to ignore the future non-wage gap component that should enter the propensity to quit. Thus, following a finding from Akerlof et al. (1988), we suspect that the job satisfaction residual is most significant in the low phases of the business cycle when wage gaps matter most for quitting and least significant in the high phases of the business cycle when non-wage gaps matter most. This interpretation of our results is not inconsistent with the actual phasing of the business cycle in Germany between 1988 and 2002. Furthermore, the coefficient of the propensity to quit variable, i.e. the job satisfaction residual, is significantly smaller than one as

[12] Since wage residuals enter the job satisfaction equation and job satisfaction residuals enter the quit equation, we paid attention to issues of identification. A close look at the results obtained in the three successive stages of estimation shows that the variables which best explain wages, job satisfaction and quits do not overlap. For instance, education and gender, which are major determinants of wages, do not exhibit stable and significant effects on job satisfaction and quits, when wage and non-wage gaps and the satisfaction residual are held constant in the relevant equation. Occupation, hours of work and region enter the wage equation but were dropped from the job satisfaction and the quit equations. Non-pecuniary satisfactions, household income and religion are used to identify job satisfaction. Similarly, tenure and family change help identify quits.

predicted by equation (4), even after allowing for our simple choice of zero discounting[13]. This result is suggestive of the role of uncertainty affecting the expectation of future events, since under certainty this coefficient would be the inverse of a discount factor and thus greater than one.

Family changes do not appear to be an important determinant of mobility after controlling for tenure. We do not rule out the possibility, however, that, if quits were regressed separately for men and women, these variables have an impact for women. But, since the aim of our study is to test the economic theory of quits, we use mainly indicators of family change as controls for non-economic reasons. Therefore, when men and women are considered together, the economic reasons for quitting prevail. All these results lead us to believe that both the job satisfaction and dynamic wealth maximization hypothesis are sound for describing quitting behavior. The job satisfaction residual is a reliable indicator of the propensity to stay, which can shed light on the determinants of quits ascribable to economic reasons.

Other important conclusions can be drawn from table 5. We find, first, that larger firms are able to retain their workers having insufficient prospects in their present job better than small firms. The probability of staying in one firm is a monotone function of firm's size in nine years out of fifteen. Lastly, tenure has a negative and highly significant effect on the probability of quitting, given the current wage. This finding confirms the robustness of previous observations of Topel and Ward (1992) and Galizzi and Lang (1998) on other data sets. Furthermore, the fundamental explanation given for this result is the persistence of uncertainty over the outcomes of own job and outside opportunities, which eventually generates a stable habit for own job. The deterrent effect of habit

[13] We obtained the same result in a previous draft (Lévy-Garboua, Montmarquette and Simonnet 2004) in which wage gaps were discounted by the real interest rate for the 1988-1991 period. However, the coefficient of the job satisfaction residual was higher in absolute value.

formation on quits outweighs whatever effect of opposite sign can be attributed to the decline of the option value of job with tenure (Mortensen, 1988).

What about the role of the overall job satisfaction variable used in previous studies to predict quits? We introduce the predicted value of the job satisfaction equation in our quit regression. This variable (along with the current wage in year *a*, discussed earlier) should not be significant when the residual of job satisfaction is considered in the regression. The method of generalized residuals of Barnow, Cain and Golberger (1981) offers an interesting test of our theory against this alternative approach. The estimation of the decision to quit with both the overall job satisfaction and the residuals of job satisfaction tests the endogeneity of the level of job satisfaction variable and confronts directly both models. The results of this regression, presented in Table 6a, reject the exogeneity assumption and unambiguously support our view that it is the unobservable characteristics of the job satisfaction and only the unobservable characteristics that influence the decision of mobility. The level of satisfaction doesn't play a role any more. A likelihood ratio test confirms that the addition of the residual of job satisfaction is significant whereas the addition of the job satisfaction is insignificant with very few exceptions[14]. Finally, we also estimated the decision to quit without the job satisfaction residual but with the predicted value of the job satisfaction equation and other controls. Table 6b shows that, contrary to previous studies (see Freeman, 1978 and Clark et al, 1998), the coefficients of the overall job satisfaction variable are almost never significant when

[14] The main exception is in 1992, since the residual is then insignificant while the overall job satisfaction is significant. However, we mentioned earlier that 1992 was a good year for which the future component of non-wage gaps should matter most. Since the latter tends to be ignored by our residual but is included in the overall job satisfaction, this result may not be inconsistent with the present analysis.

numerous control variables are included in the quitting regressions without the residuals of job satisfaction[15].

6 Conclusion

The theory of mobility is difficult to test because a worker's propensity to quit must compare the expected present values of future outcomes of the current job against outside opportunities, which are both unobservable. We have used job satisfaction as an index of the experienced preference for the present job to construct an indicator of the individual propensity to stay in the job. The latter is simply the estimated residual of a job satisfaction equation. This new indicator captures a good deal of how the expected present value of one's job (including the non-pecuniary component) compares with outside opportunities in the future. With this indicator, we were able to perform a direct test of the simple wealth maximization model of quitting behavior, and to validate the theory on fifteen large five-year panels drawn from the German Socio-Economic Panel between 1988 and 2002.

We summarize our findings by two main conclusions. The first main result of the paper is that the propensity to quit is captured by the residual, not by the level of job satisfaction itself, and that it is a major determinant of quits. However, the fundamental uncertainty which underlies the expectation of future events requires a significant departure from the standard economic theory of job mobility. The implications of uncertainty are twofold and constitute the second major result of

[15] Interestingly, Hom and Kinicki (2001) with a national survey of U.S. retail store personnel found that only withdrawal cognition and job comparison-not job satisfaction-affect the hazard rate for quits. Even Clark et al's (1998) with the GSOEP data set offered mixed evidence of job satisfaction to predict workers' probability to quit. A likelihood ratio test suggests that overall satisfaction variables are insignificant in their specification which was close to ours even if they didn't introduce the residual of job satisfaction (see their Table 3, model 5 versus model 3).

the paper. First, the propensity to quit only exerts a dampened effect on the decision to quit in the near future, as it is well known that intentions are not always followed by action. Second, uncertainty eventually generates a stable habit for own job which results in the negative effect of tenure on the probability of quitting. This last effect, which confirms previous observations by Topel and Ward (1992) and Galizzi and Lang (1998), seems to be large enough to outweigh those deriving from standard job training and job matching hypotheses.

Our approach and results confirm that economists can draw a lot of hidden information from simple subjective survey questions about job and job-related satisfactions. In doing so, they don't need to give up their traditional tools and may even gain an opportunity to sharpen them.

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Table 1
Wages, Satisfaction and Job Mobility

Years	Monthly wage (2000 inflation-adjusted DM)	Job satisfaction (% of satisfied)	Leisure satisfaction (% of satisfied)	Health satisfaction (% of satisfied)	Job mobility (% of departures)	Quits (%)
1988	2979.82	52.45	47.07	41.26	7.63	4.27
1989	3030.83	53.12	47.91	40.23	8.41	5.20
1990	3287.19	52.61	46.11	42.31	10.04	6.07
1991	3207.49	54.34	48.04	38.57	9.67	5.36
1992	3094.52	57.25	51.10	39.33	10.59	4.47
1993	2879.41	48.61	44.48	32.89	10.80	3.55
1994	2866.82	47.92	43.95	30.93	10.35	3.96
1995	2889.76	47.65	45.38	30.40	10.39	4.09
1996	2951.28	47.89	43.96	35.96	10.74	3.52
1997	2890.83	46.53	44.02	33.55	9.80	3.63
1998	2915.49	45.85	43.71	34.10	9.50	3.33
1999	2952.39	45.86	43.80	34.13	8.85	3.32
2000	2997.00	46.76	44.27	34.43	9.97	3.75
2001	2997.86	48.95	46.53	35.04	10.09	3.71

2002	3041.32 (1555.00€)	46.91	44.53	34.70	9.70	3.18

Table 2.
Quit rates (%)of workers reporting satisfaction or dissatisfaction on year a

Years	Job satisfaction (level 8-10)	Job dissatisfaction (level 0-7)
1988	3.70	4.91
1989	3.32	7.34
1990	4.62	7.69
1991	4.39	6.52
1992	4.16	4.89
1993	2.66	4.39
1994	3.11	4.75
1995	3.35	4.77
1996	3.04	3.96
1997	2.89	4.27
1998	2.67	3.89
1999	2.18	4.29
2000	2.90	4.51
2001	2.08	5.28
2002	2.30	3.95

Table 3.
Percentage of satisfied on year a and a+1

	among those who quit between a and a+1		**among those who stay between a and a+1**	
Years	satisfied on year a	satisfied on year a+1	satisfied on year a	satisfied on year a+1
1988	45.37	68.13	52.77	51.13
1989	33.85	48.70	54.18	52.03
1990	40.00	61.86	53.43	51.61
1991	44.53	67.57	54.90	56.12
1992	53.28	52.13	57.44	50.14
1993	36.43	49.51	49.06	47.22
1994	37.59	61.06	48.35	46.41
1995	39.01	54.10	48.02	46.86
1996	41.32	61.00	48.13	45.58
1997	37.10	61.17	46.89	45.83
1998	36.75	51.40	46.16	44.59
1999	30.09	58.70	46.40	45.29
2000	36.13	51.43	47.18	47.99
2001	27.41	50.91	49.79	45.97
2002	33.93	52.00	47.33	45.99

Table 4. Job Satisfaction

Years	Sum of experienced wage gaps	Satisfaction with leisure	Satisfaction with health	Household income	Experience	(Experience)^2	Heteroscedas-tic variable	Log likelihood (Nb. of observations)
1988	1.98×10^{-5} ** *(6.52×10^{-6})*	0.4650 ** *(0.0727)*	0.446 ** *(0.0697)*	1.79×10^{-5} * *(8.49×10^{-6})*	-0.0134 *(-0.0135)*	4.24×10^{-4} *(2.35×10^{-4})*	-0.0137 ** *(-0.0052)*	-1554.7 (2528)
1989	2.55×10^{-5} ** *(7.16×10^{-6})*	0.4393 ** *(0.0723)*	0.3936 ** *(0.0702)*	6.65×10^{-6} *(9.27×10^{-6})*	-0.0250 * *(-0.0111)*	6.00×10^{-4} * *(2.22×10^{-4})*	-0.0139 * *(-0.0055)*	-1554.5 (2498)
1990	1.34×10^{-5} *(7.15×10^{-6})*	0.5130 ** *(0.1032)*	0.2683 ** *(0.0635)*	2.33×10^{-5} * *(1.16×10^{-5})*	-0.0157 *(-0.0130)*	4.57×10^{-4} *(2.73×10^{-4})*	-0.0142 * *(-0.0071)*	-1187.4 (1893)
1991	1.46×10^{-5} * *(6.64×10^{-6})*	0.6767 ** *(0.0863)*	0.4684 ** *(0.0655)*	1.80×10^{-5} *(1.09×10^{-5})*	-0.0135 *(-0.0113)*	2.46×10^{-4} *(2.24×10^{-4})*	-0.0128 ** *(-0.0045)*	-1488.2 (2554)
1992	2.64×10^{-5} ** *(7.09×10^{-6})*	0.7354 ** *(0.0901)*	0.4450 ** *(0.0670)*	2.37×10^{-5} * *(1.14×10^{-5})*	-0.0256 * *(-0.0121)*	5.98×10^{-4} * *(2.52×10^{-4})*	-0.0097 * *(-0.0045)*	-1586.1 (2728)
1993	1.64×10^{-5} ** *(4.81×10^{-6})*	0.6312 ** *(0.0677)*	0.3619 ** *(0.0482)*	2.61×10^{-5} ** *(8.83×10^{-6})*	8.51×10^{-4} *(0.0106)*	8.20×10^{-5} *(2.19×10^{-4})*	-0.0163 ** *(-0.0038)*	-2169.9 (3633)
1994	2.20×10^{-5} ** *(6.63×10^{-6})*	0.8208 ** *(0.0848)*	0.4630 ** *(0.0620)*	2.17×10^{-5} ** *(1.06×10^{-6})*	-0.0039 *(-0.0125)*	1.98×10^{-4} *(2.61×10^{-4})*	-0.0035 *(-0.0039)*	-2143.7 (3556)
1995	1.24×10^{-5} * *(5.37×10^{-6})*	0.8072 ** *(0.0880)*	0.2766 ** *(0.0494)*	2.19×10^{-5} * *(9.51×10^{-6})*	-0.0288 * *(-0.0120)*	6.42×10^{-4} ** *(2.46×10^{-4})*	-0.0076 *(-0.0042)*	-2083.8 (3444)
1996	1.56×10^{-5} ** *(5.84×10^{-6})*	0.7849 ** *(0.0812)*	0.3922 ** *(0.0545)*	3.77×10^{-5} ** *(1.06×10^{-5})*	-0.0071 *(-0.0115)*	1.63×10^{-4} *(2.33×10^{-4})*	-0.0077 * *(-0.0039)*	-2043.8 (3437)
1997	2.17×10^{-5} **	0.7445 **	0.3194 **	2.53×10^{-5} **	-0.0235	5.12×10^{-4} *	-0.0093 *	-2054.3

	(5.60×10^{-6})	*(0.0815)*	*(0.0517)*	*(9.53×10^{-6})*	*(-0.0125)*	*(2.51×10^{-4})*	*(-0.0041)*	(3419)
1998	1.54×10^{-5} **	0.6512 **	0.3494 **	3.64×10^{-5} **	-0.0275 *	5.72×10^{-4} *	-0.0138 **	-2088.2
	(4.91×10^{-6})	*(0.0731)*	*(0.0495)*	*(9.96×10^{-6})*	*(-0.0112)*	*(2.25×10^{-4})*	*(-0.0041)*	(3516)
1999	2.02×10^{-5} **	0.7523 **	0.3396 **	2.29×10^{-5} *	-0.0198	4.66×10^{-4} *	-0.0121 **	-2000.6
	(5.22×10^{-6})	*(0.0792)*	*(0.0490)*	*(9.36×10^{-6})*	*(-0.0112)*	*(2.19×10^{-4})*	*(-0.0038)*	(3402)
2000	1.60×10^{-5} **	0.6335 **	0.3352 **	2.26×10^{-5} *	-0.0171	2.95×10^{-4}	-0.0124 **	-1918.6
	(5.10×10^{-6})	*(0.0796)*	*(0.0500)*	*(9.77×10^{-6})*	*(-0.0121)*	*(2.33×10^{-4})*	*(-0.0044)*	(3169)
2001	2.78×10^{-5} **	0.8328 **	0.3993 **	2.57×10^{-5} *	-0.0062	1.27×10^{-4}	-0.0020	-2209.2
	(6.92×10^{-6})	*(0.0900)*	*(0.0633)*	*(1.16×10^{-5})*	*(-0.0138)*	*(2.75×10^{-4})*	*(-0.0042)*	(3636)
2002	1.18×10^{-5} *	0.7340 **	0.2310 **	2.71×10^{-5}	-0.0213	4.63×10^{-4} *	-0.0123 **	-2110.1
	(5.09×10^{-6})	*(0.0853)*	*(0.0430)*	*(1.63×10^{-5})*	*(-0.0109)*	*(2.11×10^{-4})*	*(-0.0042)*	(3526)

Coefficients and standard errors in parentheses. * denotes significance at 5% level and ** denotes significance at 1% level. Regressions control for education (high diploma have significantly positive coefficients 4 times), marital status (single significantly negative 5 times), gender (women have been founded more satisfied twice), religion and political activities.

Table 5. Quits

Years	Job satisfaction residual	Experience	Tenure	Size of the company : GE 200 LT 2000	Size of the company : GE 2000	Log likelihood (Nb. of observations)
1988	-0.1366 *(0.0995)*	-0.0163 ** *(0.0059)*	-0.0240 ** *(0.0080)*	n.s.	n.s.	-399.1 (2528)
1989	-0.4914 ** *(0.1052)*	-0.0112 * *(0.0059)*	-0.0387 ** *(0.0087)*	n.s.	n.s.	-446.0 (2498)
1990	-0.1836 *(0.0994)*	-0.0064 *(0.0078)*	-0.0466 ** *(0.0086)*	n.s.	n.s.	-368.9 (1893)
1991	-0.2467 ** *(0.0934)*	-0.0046 *(0.0048)*	-0.0568 ** *(0.0084)*	-0.3748 ** *(0.1214)*	-0.3607 ** *(0.1231)*	-433.7 (2554)
1992	-0.0535 *(0.1003)*	-0.0003 *(0.0051)*	-0.0517 ** *(0.0089)*	-0.5404 ** *(0.1373)*	-0.4774 ** *(0.1384)*	-420.3 (2728)
1993	-0.2376 ** *(0.0905)*	-0.0078 *(0.0050)*	-0.0157 ** *(0.0059)*	n.s.	n.s.	-519.0 (3633)
1994	-0.3176 ** *(0.0928)*	-0.0071 *(0.0048)*	-0.0272 ** *(0.0065)*	-0.3142 * *(0.1229)*	n.s	-551.6 (3556)
1995	-0.1960 * *(0.0935)*	-0.0172 ** *(0.0056)*	-0.0355 ** *(0.0074)*	n.s.	n.s.	-543.3 (3444)
1996	-0.1420 *(0.0936)*	-0.0039 *(0.0049)*	-0.0382 ** *(0.0074)*	-0.3082 * *(0.1283)*	n.s.	-477.2 (3437)
1997	-0.1900 *	-0.0089	-0.0284 **	n.s.	n.s.	-497.9

	(0.0956)	*(0.0053)*	*(0.0072)*			(3419)
1998	-0.2802 **	-0.0112 *	-0.0338 **	n.s.	-0.3475 *	-470.1
	(0.0948)	*(0.0055)*	*(0.0076)*		*(0.1346)*	(3516)
1999	-0.4824 **	-0.0150 **	-0.0416 **	n.s.	-0.3728 *	-428.4
	(0.1061)	*(0.0057)*	*(0.0086)*		*(0.1513)*	(3402)
2000	-0.2179 *	-0.0057	-0.0361 **	-0.3731 **	-0.2709 *	-446.3
	(0.0903)	*(0.0050)*	*(0.0071)*	*(0.1230)*	*(0.1216)*	(3169)
2001	-0.4832 **	-0.0121 *	-0.0357 **	-0.3413 **	-0.3919 **	-507.9
	(0.1015)	*(0.0053)*	*(0.0077)*	*(0.1324)*	*(0.1381)*	(3636)
2002	-0.1982 *	-0.0063	-0.0391 **	n.s.	-0.5447 **	-449.7
	(0.1013)	*(0.0055)*	*(0.0082)*		*(0.1584)*	(3526)

Coefficients and standard errors in parentheses. * denotes significance at 5% level and ** denotes significance at 1% level. Regressions control for education (high diploma have significantly positive coefficients 4 times and significantly negative coefficients twice), family change (child out and separation have significantly positive coefficients one time), household income, wage and gender.

Table 6A. Quits (alternative specification)

Years	Job satisfaction residual	Predicted value of Job satisfaction	Log likelihood (Nb. of observations)
1988	-0.1366 *(0.0995)*	0.0035 *(0.2724)*	-399.1 (2528)
1989	-0.4918 ** *(0.1052)*	-0.1145 *(0.2983)*	-445.9 (2498)
1990	-0.1885 *(0.0995)*	-0.5687 *(0.3097)*	-367.2 (1893)
1991	-0.2461 ** *(0.0933)*	-0.0970 *(0.2057)*	-433.5 (2554)
1992	-0.0509 *(0.0983)*	-0.6227 ** *(0.2292)*	-416.6 (2728)
1993	-0.2385 ** *(0.0905)*	-0.1733 *(0.2054)*	-518.6 (3633)
1994	-0.3166 ** *(0.0924)*	-0.0509 *(0.0979)*	-550.8 (3556)
1995	-0.2012 * *(0.0946)*	-0.3294 *(0.2306)*	-542.2 (3444)
1996	-0.1426 *(0.0938)*	-0.0435 *(0.2161)*	-477.2 (3437)
1997	-0.1932 *	-0.2172	-497.5

Table 6B. Quits (alternative specification)

Predicted value of Job satisfaction	Log likelihood (Nb. of observations)
0.0027 *(0.2728)*	-400.0 (2528)
-0.0882 *(0.2988)*	-457.7 (2498)
-0.5549 *(0.3102)*	-368.9 (1893)
-0.1018 *(0.2052)*	-437.1 (2554)
-0.6233 ** *(0.2292)*	-416.7 (2728)
-0.1662 *(0.2051)*	-522.2 (3633)
0.2618 *(0.2076)*	-556.9 (3556)
-0.3139 *(0.2283)*	-544.6 (3444)
-0.0353 *(0.2153)*	-478.4 (3437)
-0.2122	-499.5

	(0.0960)	*(0.2302)*	(3419)	*(0.2303)*	(3419)
1998	-0.2789 **	0.1791	-469.8	0.1833	-474.3
	(0.0945)	*(0.2178)*	(3516)	*(0.2172)*	(3516)
1999	-0.4816 **	0.0579	-428.4	0.0819	-439.7
	(0.1061)	*(0.2220)*	(3402)	*(0.2178)*	(3402)
2000	-0.2169 *	-0.2081	-445.9	-0.2124	-448.9
	(0.0903)	*(0.2243)*	(3169)	*(0.2233)*	(3169)
2001	-0.4831 **	-0.5258 *	-505.3	-0.5120 *	-517.8
	(0.1015)	*(0.2337)*	(3636)	*(0.2300)*	(3636)
2002	-0.2050 *	-0.5348 *	-447.2	-0.5283 *	-449.2
	(0.1031)	*(0.2459)*	(3526)	*(0.2458)*	(3526)

Coefficients and standard errors in parentheses. * denotes significance at 5% level and ** denotes significance at 1% level. Regressions control for education, experience, tenure, size of the company, family change, household income, wage and gender.

Appendix 1

Estimation of experienced wage gaps

The objective pursued in estimating the wage equations is to recover the individual experienced wage gaps appearing in equation (7): $\varepsilon_{it} \equiv y_{it} - y_{it}^*$. The opportunity wage y_{it}^* should capture the average wage currently offered by the market to this individual. It is approximated by the average income received by a worker with similar productive characteristics. In practice, only employed workers are being observed over four consecutive years. Wages are expressed in levels, not in logarithms, because the model of satisfaction and quits presented in section 2 is additive in wage gaps. Relevant characteristics include hours of work, education (degree), experience, experience squared, gender, marital status, nationality, occupation, sector, satisfaction with health and region. Seniority is not included in this list because it is irrelevant to workers leaving their job for unemployment or a new job.

The main difficulty with this estimation lies in disentangling the individually experienced wage gap from any individual-specific effect that might be included in the residual. The individual fixed effect captures the returns to individual characteristics unknown by the econometrician that are being observed by all firms and workers. Since these returns are not job-specific, they cannot be deemed to contribute to the individual's reasons for staying with the present employer. Thus, we must subtract the individual fixed effect from the residual in order to ensure that we only retain the latter as a measure for the experienced wage gap. Standard panel data techniques cannot be used for the present purpose because they eliminate the fixed effect from the estimated residual at the cost of imposing the nullity of each within-mean residual over the entire period of observation, i.e. $\sum_{t=1}^{T}(\varepsilon_{it} - \varepsilon_{i\cdot}) = 0, \forall i \in \{1,\ldots,N\}$. This assumption is inappropriate here since the satisfaction model is consistent with some workers receiving positive or negative rents on their job over an extended period of time. A more appropriate assumption is that the between-mean residual be zero for each specific year over the entire population, i.e. $\sum_{i=1}^{N}\varepsilon_{it} = 0, \forall t \in \{1,\ldots,T\}$. Consequently, we chose to estimate the

wage equations on four successive years simultaneously by Zellner's (1962) seemingly unrelated regression method. The latter assumes that the four annually determined residuals would have zero mean and allows for a correlation between them without requiring any specific form for this correlation. Thus we can account for the autocorrelation of individual residuals over time and compute the best linear unbiased estimator. The estimated residuals $(\hat{\varepsilon}_{it})$ define the wage gaps that will be used, in the second stage, to explain job satisfaction. Results of the simultaneous estimation of wage equations on four consecutive years for the four overlapping panels of workers whose quitting behavior are comparable to those generally obtained from single wage equations. All explanatory variables are significant with the expected sign for the coefficient.